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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/612,490

Applicant: Harald Schlag

Filed: July 2, 2003

Title: CONDUCTIVE COMPONENT FOR ELECTROMECHANICAL CELLS AND A METHOD FOR ITS MANUFACTURE

Art Unit: 1745

Examiner: Thomas H. Parsons

Attorney Docket No.: GP-301444

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## APPEAL BRIEF

Sir:

On September 29, 2006, Appellant filed a Notice of Appeal of Final Rejection in the final Office Action of July 3, 2006. Appellant appeals the rejection of claims 1-12 and 22-27 as set forth in the final Office Action of July 3, 2006.

Please charge the requisite fee for filing this Appeal Brief and any other required fees or credit any excess to Deposit Account No. 07-0960.

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**I – Real Party in Interest**

The real party in interest is General Motors Corporation.

**II – Related Appeals and Interferences**

There are no related appeals and/or interferences known to Appellant, his assignee, and/or legal representatives that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

**III – Status of the Claims**

Claims 1-12 and 22-27 have been rejected.

Claims 6, 12-21 have been canceled.

Claims 1-5, 7-11, and 22-27 are being appealed.

This application contains no other claims.

**IV – Status of the Amendments**

In a telephone interview on October 23, 2006, Examiner Thomas H. Parsons indicated that the Proposed Amendment After Final filed on September 29, 2006 would be entered by the Examiner. This Appeal Brief reflects the Proposed Amendment After Final dated September 29, 2006.

**V – Summary of the Claimed Subject Matter**

Independent Claim 1 recites a product comprising two spaced apart fuel cell bipolar plates 10. Page 6, lines 7-9, figure 1; page 7, lines 21-25, figure 4. Claim 1 further recites each bipolar plate having gas flow channels 28 and a doped coating 44 deposited on the bipolar plate 10. Page 6, lines 20-24, figure 1; page 7, lines 30-32, page 8, lines 1-6, figures 2 and 4. Claim 1 further recites the doped coating 44 comprising at least one of a doped diamond coating or a doped diamond-like coating. Page 7, lines 30-

32; page 8, lines 1-6. Claim 1 further recites the product further comprising an electrolyte membrane 42 interposed between the two spaced apart fuel cell bipolar plates. Page 7, lines 21-25, figure 4.

Independent Claim 25 recites a product comprising a coating 44 over an intrinsically corrosion resistant and conductive fuel cell bipolar plate 10. Page 7, lines 30-32, figures 2-4. Claim 25 further recites the product having gas flow passages 28 formed therein and gas supply openings 20 and gas discharge openings 24. Page 6, lines 16-24, figure 1. Claim 25 further recites the coating 44 comprising at least one of a doped diamond coating or a doped diamond-like carbon coating. Page 7, lines 30-32; page 8, lines 1-6.

## VI – Grounds of Rejection to be Reviewed on Appeal

The ground of rejection presented for review is as follows:

**Whether claims 1-12 and 22-27 are unpatentable under 35 U.S.C. 103(a) over Adlhart et al. (U.S. 3,623,913) in view of Lemelson (U.S. 5,740,941).**

## VII – Argument

**Whether claims 1-12 and 22-27 are unpatentable under 35 U.S.C. 103(a) over Adlhart et al. (U.S. 3,623,913) in view of Lemelson (U.S. 5,740,941).**

Appellants respectfully request the Board to review and reverse the Examiner's rejection of claims 1-12 and 22-27 as being unpatentable over Adlhart et al. '913 in view of Lemelson '941 for the following reasons. However, claims 6 and 12 have been canceled rendering the rejection of claims 6 and 12 moot.

**1. One skilled in the art would not have been motivated to combine Adlhart et al. '913 and Lemelson '941 as of the filing date.**

To establish a prima facie case of obviousness, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." MPEP 2143. The final Office Action of July 3, 2006, at pages 6-7, states:

> [I]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the bipolar plate of Adlhart et al. by substituting the protective coating with the doped diamond coating or doped diamond-like carbon coating of Lemelson because Lemelson teaches a coating that would have provided new and improved structures in articles of manufacture capable of resisting erosion and surface scratching caused by abrasive particles, expansion and contraction due to uneven heating and corrosive effects of chemicals ([citing Lemelson] col. 3: 8-20 and col. 5: 50-61).

Neither Adlhart et al. '913 nor Lemelson '941 suggests "a doped diamond coating or a doped diamond-like coating" on or over a fuel cell bipolar plate as recited in Applicant's independent claims 1 and 25. The final Office Action of July 3, 2006, at page 6, acknowledges that Adlhart et al. '913 "do [sic] not disclose a doped coating comprising at least one of a doped diamond coating or doped diamond-like coating" as recited in Applicant's independent claims 1 and 25.

Lemelson '941 discloses numerous products on which a diamond-like material may be deposited. However, of the estimated 100 plus possible products on which such a coating might be deposited, Lemelson never suggests placing such a coating on a fuel cell bipolar plate. Further, there is no evidence that Lemelson reduced any of these numerous possible devices to practice. The Lemelson disclosure is so broad that the statements

therein can only be viewed as pure speculation. Notwithstanding the speculative nature of the disclosure, none of the disclosed devices suggest "a doped diamond coating or a doped diamond-like coating" on or over a fuel cell bipolar plate as recited in independent claims 1 and 25.

Furthermore, there is no suggestion that the gold coating disclosed in Adlhart et al. '913 is equivalent to a doped diamond or doped diamond-like coating for purposes of protecting a bipolar plate in the environment of a fuel cell. Neither Lemelson '941 nor Adlhart et al. '913 provide a person of ordinary skill in the art a reasonable expectation of success using a doped diamond coating or a doped diamond-like coating on a fuel cell bipolar plate and that such would be successful in the corrosive environment of a fuel cell. See MPEP 2143.02 ("The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) . . . .").

**2. The proposed combination and modification necessary to arrive at Appellant's invention is impermissible because such would render Adlhart et al. '913 unsatisfactory for its intended purpose.**

Appellant's claim 1 recites "two spaced apart fuel cell bipolar plates, each bipolar plate having . . . a doped coating deposited on the bipolar plate, the doped coating comprising at least one of a doped diamond coating or a doped diamond-like coating" and Appellant's claim 25 recites "a coating over an intrinsically corrosion resistant and conductive fuel cell bipolar plate . . . , said coating comprising at least one of a doped diamond coating or a doped diamond-like carbon coating."

The proposed combination and modification of Adlhart et al. '913 necessary to arrive at Appellant's invention is improper in establishing a prima facie case of obviousness because it would render Adlhart et al. '913 unsatisfactory for its intended function (providing an imperious protective coating over the bipolar plate). See MPEP 2143.01(V) which states in part:

> If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) . . . .

Lemelson '941 suggests that his synthetic diamond coating may be applied to a fuel cell electrode (col. 15, lines 52-57). However, a person skilled in the fuel cell art would recognize that fuel cell electrodes are porous as disclosed in Adlhart et al. '913 (col. 4, lines 48-62). The porosity of the fuel cell electrode allows reactant gases to flow into and through the electrode and to undergo a reaction catalyzed by a catalyst contained in the electrode. Thus, in order for the electrode to still function, the Lemelson '941 synthetic diamond coating over the electrode must be porous to ensure that the reactant gases can flow through the synthetic diamond coating and into the electrode.

Adlhart et al. '913 discloses that the bipolar plates are impervious metals, e.g. of gold-coated aluminum (col. 4, lines 66-68) and that the plates may employ 3 mm thick aluminum coating with a thin gold plate as a suitable protection against attack by the electrolyte (85-100% phosphoric acid) (col. 6, lines 61-65 and col. 4, lines 48-54). The proposed substitution of the synthetic diamond coating on the fuel cell electrode of Lemelson '941 for the gold coating of Adlhart et al. '913 would result in a bipolar plate coated with a porous synthetic diamond coating. Such a porous coating would not protect

the bipolar plate "from the electrolyte" or the corrosive environment of a fuel cell which may include hydrofluoric acid that would attack the bipolar plate through the porous synthetic diamond coating of Lemelson'941. Thus, the proposed combination and modification is improper because it would render Adlhart et al. '913 unsatisfactory for its intended purpose of providing an imperious protective coating over the bipolar plate.

**3. Both Lemelson '941 and Adlhart et al. '913 teach away from the proposed combination and modification.**

Further, both Lemelson '941 and Adlhart et al. '913 teach away from the claimed invention. The disclosure in Lemelson '941 of 100 plus possible products on which a doped diamond-like coating may be deposited, none of which products is a fuel cell bipolar plate, actually teaches away from Applicant's claimed invention. For example, in Radio Steel & Manufacturing Co. v. MTD Products, Inc., 731 F.2d 840, 846 (Fed. Cir. 1984), the Federal Circuit held that where all of the wheelbarrows disclosed in the prior art relied upon included a juncture behind the bowl rather than under the bowl, "the uniform indication in the references that the juncture is behind the bowl teaches away rather than toward the claimed invention."

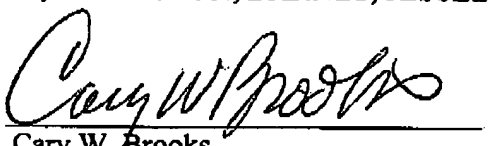
The Examiner's attention is also respectfully directed to Adlhart et al. '913, column 4, lines 64-68 which teaches the use of gold-coated aluminum for bipolar plates. Because no equivalency between a gold coating and a doped diamond coating has been established with respect to the use of such coatings in a fuel cell environment, the Adlhart et al. '913 teaching of the use of a gold-coated aluminum material for bipolar plates actually teaches away from Applicant's claimed invention.

## CONCLUSION

The 103(a) rejection of Appellant's claims should be reversed because: (1) one skilled in the art would not have been motivated to combine the prior art references as of the filing date; (2) the proposed combination and modification necessary to arrive at Appellant's invention is impermissible because such would render Adlhart et al. '913 unsatisfactory for its intended purpose; and (3) the prior art teaches away from the proposed combination and modification. Appellant maintains that no prima facie case of obviousness has been established. Appellants respectfully request the Board to reverse the Examiner's rejection of claims 1-12 and 22-27 now in the case.

Respectfully submitted,

REISING, ETHINGTON, BARNES, KISSELLE, P.C.



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Dated: October 24, 2006

**VIII – Claims Appendix**

1. (Previously Presented) A product comprising two spaced apart fuel cell bipolar plates, each bipolar plate having gas flow channels and a doped coating deposited on the bipolar plate, the doped coating comprising at least one of a doped diamond coating or a doped diamond-like coating, and further comprising an electrolyte membrane interposed between the two spaced apart fuel cell bipolar plates.

2. (Previously Presented) A product in accordance with claim 1, said doped coating being doped with foreign atoms comprising one of foreign atoms of the main groups of the periodic table of elements, foreign atoms of the side groups of the periodic table of elements and foreign atoms belonging to the rare earths of the periodic table of elements.

3. (Previously Presented) A product in accordance with claim 1, said doped coating being doped with at least one of Ti, W, or Au.

4. (Previously Presented) A product in accordance with claim 1, said doped coating being doped with at least one of B, Sc, Y, Nb, V, Fe, Cr, Ni, Mn, Zr, Mo, Ta, Hf, Pt, Pd, Re, Ru, Rh, Ir, or Ag.

5. (Previously Presented) A product in accordance with claim 2, said doped coating having between more than 0% and 35% foreign atoms.

6. (Canceled)

7. (Previously Presented) A product in accordance with claim 4, said doped coating having between more than 0% and 35% foreign atoms.

8. (Previously Presented) A product in accordance with claim 4, said doped coating having between 10 and 20% foreign atoms.

9. (Previously Presented) A product in accordance with claim 1, said doped coating having a layer thickness above 0 μm and below 10 μm.

10. (Previously Presented) A product in accordance with claim 1, said doped coating having a layer thickness in the range from 1 nm to 150 nm.

11. (Previously Presented) A product in accordance with claim 1, wherein each bipolar plate comprising at least one of titanium, stainless steel, steel, steel with no additional alloying element, aluminum, magnesium or an alloy of any of the foregoing.

12. (Canceled)

13. (Canceled)

14. (Canceled)

15. (Canceled)

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (Canceled)

20. (Canceled)

21. (Canceled)

22. (Previously Presented) A product as set forth in claim 1 further comprising a cathode on one side of the electrolyte membrane and an anode on another side of the electrolyte membrane.

23. (Previously Presented) A product as set forth in claim 1 wherein each bipolar plate comprises an intrinsically corrosion resistant and conductive metal.

24. (Previously Presented) A product as set forth in claim 23 wherein the intrinsically corrosion resistant and conductive metal comprises stainless steel.

25. (Previously Presented) A product comprising a coating over an intrinsically corrosion resistant and conductive fuel cell bipolar plate having gas flow passages formed therein and gas supply openings and gas discharge openings, said coating comprising at least one of a doped diamond coating or a doped diamond-like carbon coating.

26. (Previously Presented) A product in accordance with claim 25, said doped coating being doped with at least one of: Ti, W, Au, B, Sc, Y, Nb, V, Fe, Cr, Ni, Mn, Zr, Mo, Ta, Hf, Pt, Pd, Re, Ru, Rh, Ir, or Ag.

27. (Previously Presented) A product in accordance with claim 25 wherein the bipolar plate comprises stainless steel.

## IX – Evidence Appendix

None

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## X – Related Proceedings Appendix

None